We claim:

1. A process for the preparation of ethyldimethylamine and triethylamine with the following steps:

   (i) reaction of a mixture of diethylamine and dimethylamine with ethylene in the presence of a catalyst from the group of alkali metal dimethylamides, alkali metal diethylamides and alkali metal hydrides

   (ii) removal of the catalyst

   (iii) distillation separation of the resulting mixture in triethylamine and ethyldimethylamine and optionally diethylamine and dimethylamine

   (iv) optional return of the catalyst and of the starting amines to the reaction.

2. A process as claimed in claim 1, wherein diethylamine is used in excess, the diethylamine/triethylamine ratio is preferably (8 to 15):1, in particular 10:1.

3. A process as claimed in claim 1 or 2, wherein ethylene is used in excess.

4. A process as claimed in any of claims 1 to 3, wherein the alkali metal is chosen from Li, Na or K, preferably Na.

5. A process as claimed in any of claims 1 to 4, wherein the catalyst is chosen from Na diethylamide and Na dimethylamide and mixtures thereof.

6. A process as claimed in any of claims 1 to 5, wherein the metal amide is prepared prior to use in the reaction from dimethylamine or diethylamine or a mixture thereof in a manner known per se.

7. A process as claimed in any of claims 1 to 6, wherein the streams passed to the reactor comprise 0 to 1% by weight, preferably < 0.1% by weight, of ammonia, 0 to 5%,by weight, preferably < 1% by weight, of (monoethylamine + monomethylamine), 20 to 80% by weight, preferably 40 to 70% by weight, of (diethylamine + dimethylamine), 0 to 50% by weight, preferably < 40% by weight, of triethylamine, 5 to 50% by weight,

preferably 10 to 30% by weight, of ethylene, 0.01 to 20% by weight, preferably 0.1 to 2% by weight, of the catalyst and 0 to 20% by weight of a solvent for the catalyst.

8. A process as claimed in any of claims 1 to 7, wherein the preparation of the amide and the hydroamination are carried out in a single process stage.

9. A process as claimed in any of claims 1 to 8, wherein a cocatalyst from the group of cyclic or open-chain imine or of tautomeric enamine compounds is used.

10. A process as claimed in any of claims 1 to 9, wherein some of the amine mixtures obtained following removal of the catalyst is separated, some of the triethylamine is transalkylated in an isomerizing manner with the addition of ammonia, and the resulting diethylamine, following removal, is returned as starting material to the reactor.